

Assessment of Water Reuse Potential in a Metal Finishing Factory

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Abstract : Although water reclamation and reuse are inseparable parts of sustainable production concept all around the world, current levels of reuse constitute only a small fraction of the total volume of industrial effluents. Nowadays, within the perspective of serious climate change, wastewater reclamation and reuse practices should be considered as a requirement. Industrial sector is one of the largest users of water sources. The OECD Environmental Outlook to 2050 predicts that global water demand for manufacturing will increase by 400% from 2000 to 2050 which is much larger than any other sector. Metal finishing industry is one of the industries that requires high amount of water during the manufacturing. Therefore, actions regarding the improvement of wastewater treatment and reuse should be undertaken on both economic and environmental sustainability grounds. Process wastewater can be reused for more purposes if the appropriate treatment systems are installed to treat the wastewater to the required quality level. Recent studies showed that membrane separation techniques may help in solving the problem of attaining a suitable quality of water that allows being recycled back to the process. The metal finishing factory where this study is conducted is one of the biggest white-goods manufacturers in Turkey. The sheet metal parts used in the cookers production have to be exposed to surface pre-treatment processes composed of degreasing, rinsing, nanoceramics coating and deionization rinsing processes, consecutively. The wastewater generating processes in the factory are enamel coating, painting and styrofoam processes. In the factory, the main source of water is the well water. While some part of the well water is directly used in the processes after passing through resin treatment, some portion of it is directed to the reverse osmosis treatment to obtain required water quality for enamel coating and painting processes. In addition to these processes another important source of water that can be considered as a potential water source is rainwater (3660 tons/year). In this study, process profiles as well as pollution profiles were assessed by a detailed quantitative and qualitative characterization of the wastewater sources generated in the factory. Based on the preliminary results the main water sources that can be considered for reuse in the processes were determined as painting and styrofoam processes.

Keywords : enamel coating, painting, reuse, wastewater

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